CTIO Projects in Support of Air Force Space Command

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Overview

- **CTIO Focus/Capabilities**
- **Technology Readiness Levels (TRLs)**
- **Completed Efforts**
  - **Support Equipment Coatings (ICBM SE – HAFB)**
  - **Missile Suspension System (MSS – VAFB)**
- **Efforts in Progress**
  - **Support Equipment Coatings: Transporter Erector (FEW)**
  - **AFSPC & NASA Launch Coatings (CCAFS)**
  - **AFSPC Opportunity Assessment (CCAFS & JDMTA)**
  - **F.E. Warren Opportunity Assessment (FEW)**

CTIO Focus and Capabilities

CTIO Focus and Capabilities

- **Primary focus is integration of Commercial Off-the-Shelf (COTS) technology**
- **CTIO provides a range of support for Air Force organizations**
  - **Mechanical, chemical, and environmental testing**
    - **ISO 17025 Certified**
    - **SAE AS 5505 Accredited**
  - **Coatings Test Method Development**
  - **Technical consultation**
  - **Technology transfer**
  - **AF Voting Member on SAE G-8**

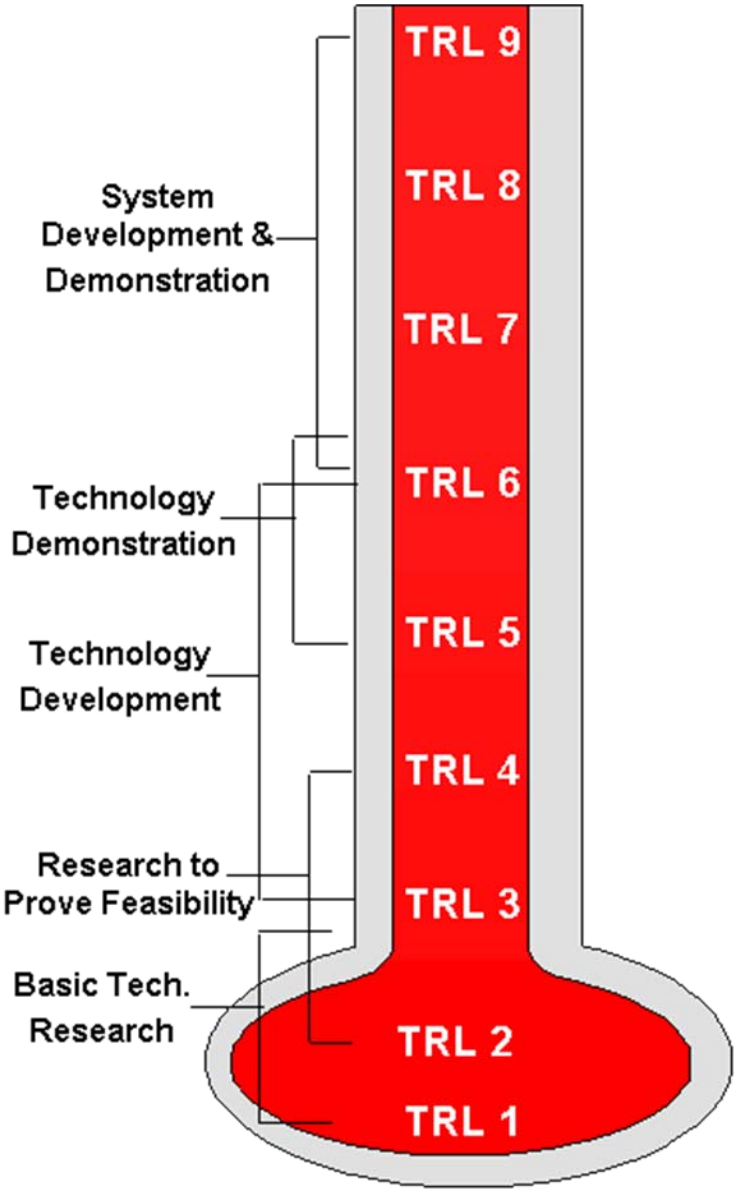
Technology Readiness Assessment

CTIO Focus

TRLs

Completed Projects
- ICBM SE
- MSS

In-Progress
- ICBM SE: TE
-AFSPC/NASA
- OPP 1
- OPP 2



Technology Readiness Level (TRL)

(Definitions taken from DoD 5002-R, 5 Apr 2002)

Technology Readiness Assessment

CTIO Focus

TRLs

Completed Projects
- ICBM SE
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TRL 9	• Best material formulation, application processes, and equipment proven through successful mission operations
TRL 8	• Best material formulation, application processes, and equipment qualified through test and demonstration
TRL 7	• Best material formulation, application processes, and equipment demonstrated in an operational environment
TRL 6	• Best material formulation, application processes, and equipment demonstrated in a relevant environment
TRL 5	• Top material formulations validated in a relevant environment
TRL 4	• Candidate material formulations tested against full spectrum of tests in laboratory. Material specification is frozen
TRL 3	• Screening test weed out poor material formulations. Detailed material specification is developed
TRL 2	• Material formulations vary wildly. Key requirements are documented
TRL 1	• Basic principles of materials observed and reported. Requirements are non-specific and incomplete

Completed Efforts

- **Completed Efforts (FY08)**
  - **Support Equipment Coatings (ICBM SE – HAFB)**
    - **Continuation pending**
  - **Missile Suspension System(MSS – VAFB)**
    - **Continuation pending**

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Support Equipment Coatings

Support Equipment Coatings

TRL 8

- **Project Goals/Requirements**
  - Continuation of Logistics Environmental Office Pollution Prevention Project; Air Force Potential Alternatives Report; Low/No VOC Corrosion-Preventive Coatings for ICBM Missile Support Equipment
  - Incorporation of metal wire arc spray (MWAS) technology where possible
  - Lower hazardous waste production and environmental impact of operations
- **T.O. 35M4-3-6-1: Standard procedure to repair damaged coatings**
  - Complete de-paint and re-coat per T.O. 35-1-3
  - Scuff and re-coat (T.O. 35-1-3 per T.O. 35M4-3-6-1)

Support Equipment Coatings

TRL 8

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Coating Systems, Scuff-and-Shoot, Side Access Doors				
	Substrate	**Pretreatment**	**Primer**	**White Topcoat**
System 1	Aluminum	None	Deft 65-Y-001A	Deft 55-W-002
System 2	Aluminum	None	Deft 65-Y-001A	Deft 36-W-005
Coating Systems, Strip-and-Recoat, Side Access Doors				
	Substrate	**Pretreatment**	**Primer**	**White Topcoat**
System 3	Aluminum	PreKote	Deft 65-Y-001A	Deft 55-W-002
System 4	Aluminum	PreKote	Deft 65-Y-001A	Deft 36-W-005
Coating Systems, Strip and Recoat, Rear Removable Bumper				
	Substrate	**Pretreatment**	**Primer**	**Blue Topcoat**
System 5 (Left half)	Steel	None	Hentzen 00812FEP-ZVOC	Hentzen 04605BUX-ZVOC
System 6 (Right half)	Steel	None	Deft 65-Y-001A	Deft 55-BL-007
Coating Systems for Rear Landing Gear of RMS				
	Substrate	**Pretreatment**	**Primer**	**Blue Topcoat**
System 7	Steel	Metallize	(discretionary)	(discretionary)

Support Equipment Coatings

TRL 8

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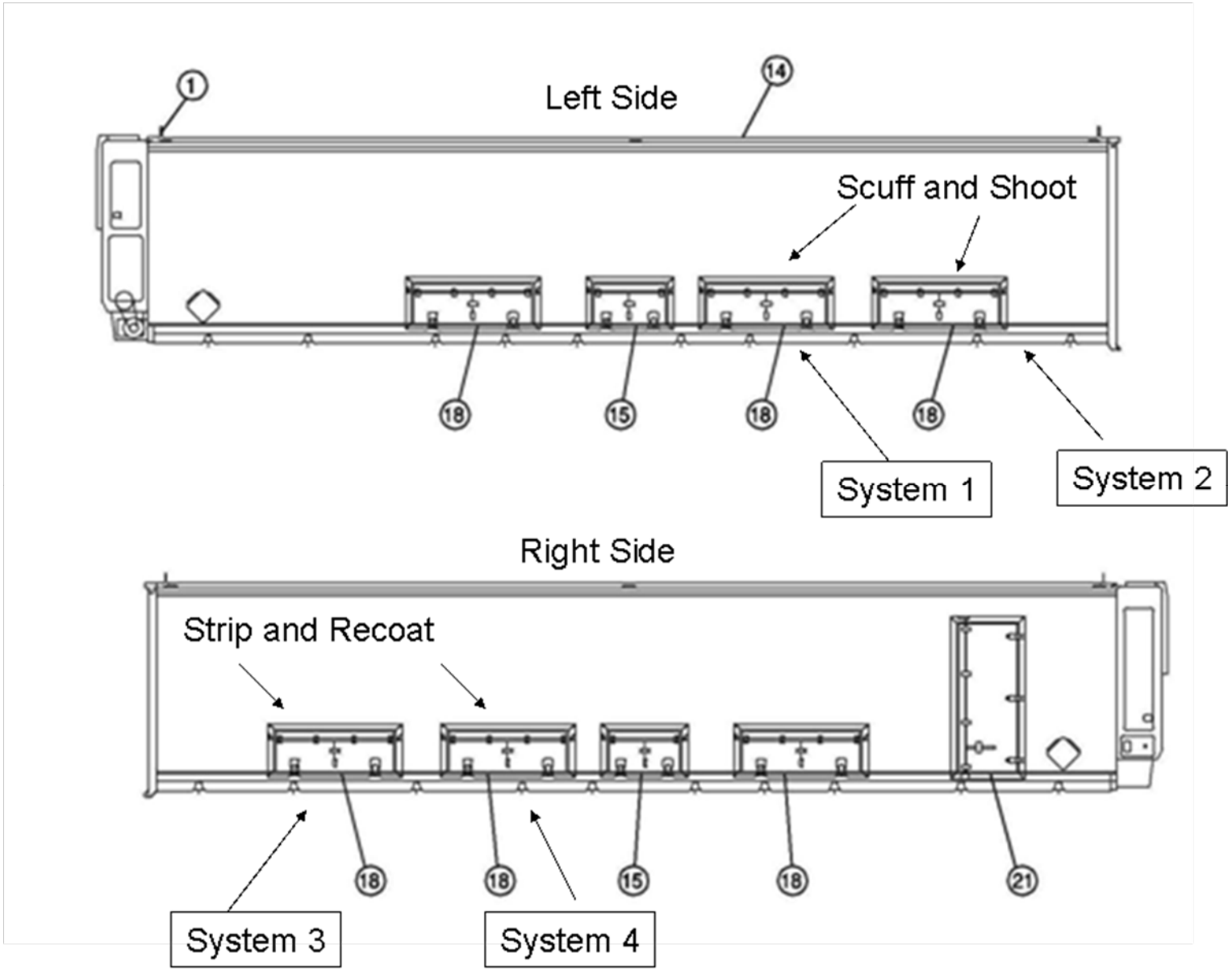

Support Equipment Coatings

TRL 8

CTIO Focus

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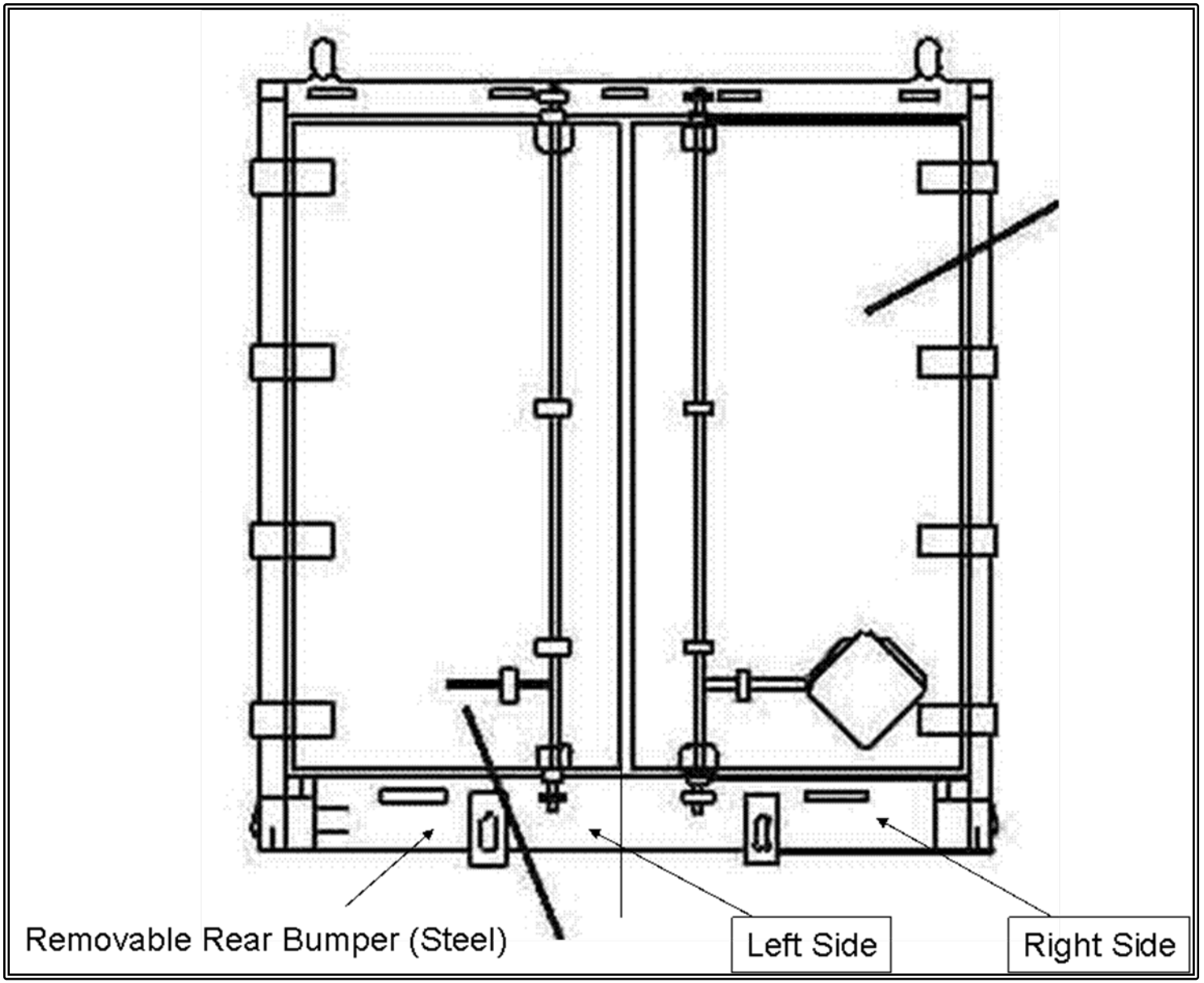

Support Equipment Coatings

TRL 8

- CTIO Focus
- TRLs
- Completed Projects
  - ICBM SE
  - MSS
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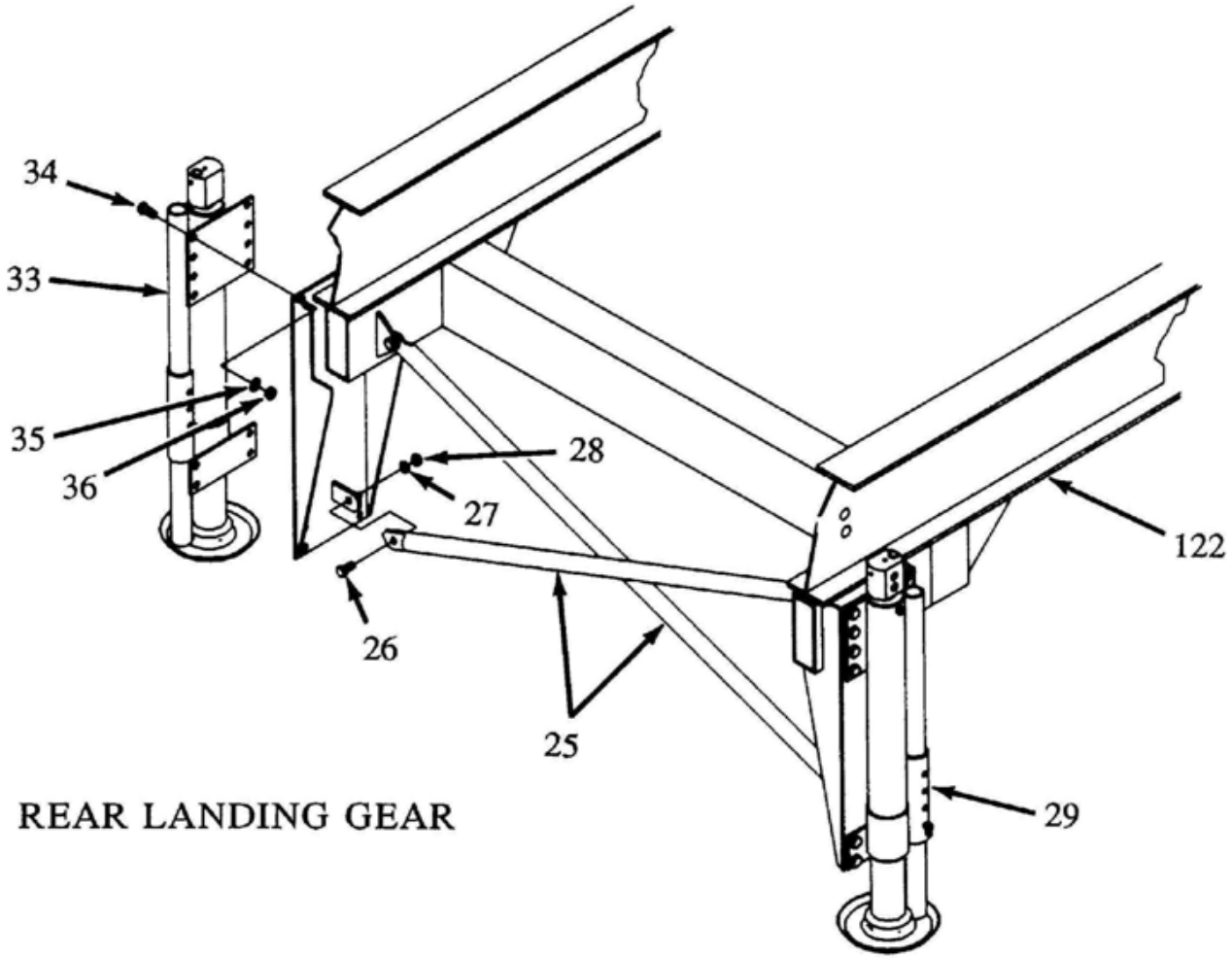
T.O. 35M4-3-6-1



REAR LANDING GEAR

Support Equipment Coatings

TRL 8

CTIO Focus

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- **Coating evaluation**
  - **At initial, 1 year, and 2 years (end-of-test)**
    - **ASTM D 610 Evaluating Degree of Rusting on Painted Steel Surfaces**
      - **Rating of 7 or better on 0-10 scale (0.1% - 0.3% rust)**
    - **ASTM D 714 Evaluating Degree of Blistering of Paints**
      - **Rating of 8-Few or better on 2,4,6,8,10 and D,MD,M,F scales**
    - **ASTM D 660 Evaluating Degree of Checking of Exterior Paints (adhesion)**
    - **ASTM D 661 Evaluating Degree of Cracking of Exterior Paints (adhesion)**
    - **ASTM E 308 Computing the Color of Objects by Using the CIE System**
      - **ΔE of greater than 1 on a cleaned, exposed surface**

Support Equipment Coatings

Current Status

- Coatings have been applied to RMS at Hill AFB

Final Tasks

- Complete final report
- Follow on project-Evaluate coatings
- Complete addendum for follow-on work on Transporter Erector

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Missile Suspension System

Missile Suspension System

TRL 8+

- **Project Goals/Requirements**
  - **Demonstrate/Validate metallization for high-temperature applications**
  - **Platform is the Minuteman III weapons system support equipment (MSS) for the 309 MMXG depot refurbishment squadron located at Vandenberg AFB**
  - **Project carried forward suggestions from a P2OA for Vandenberg AFB**
    - **Reviewed coatings work performed by other DoD groups**
      - **NASA TEERM**
      - **AFRL/RXBT**
      - **AFRL/RXSSO Ballistic Foam coating alternatives work**

Missile Suspension System

TRL 8+

CTIO Focus

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Missile Suspension System

TRL 8+

Current Status

- Final report has been completed
- Test plan for Dem/Val is currently in routing

Final Tasks

- Follow-on work pending

Efforts In Progress

- **Efforts in Progress (FY-08, FY-09)**
  - **Support Equipment Coatings: Transporter Erector (ICBM SE – FEW)**
  - **AFSPC & NASA Launch Coatings (CCAFS)**
  - **AFSPC Opportunity Assessment (CCAFS & JDMTA)**
  - **F.E. Warren Opportunity Assessment (FEW)**

Support Equipment Coatings: Transporter Erector

Transporter Erector

TRL 8

- **Project Goals/Requirements**
  - **Continuation of Logistics Environmental Office Pollution Prevention Project; Air Force Potential Alternatives Report; Low/No VOC Corrosion-Preventive Coatings for ICBM Missile Support Equipment**
  - **Incorporation of metal wire arc spray (MWAS) technology where possible**
  - **Lower hazardous waste production and environmental impact of operations**

Transporter Erector

TRL 8

- **On Aluminum:**
  - **Deft 02GN084 nonchromated epoxy primer (submitted for MIL-PRF-23377 qualification)**
  - **Deft 55W002 waterborne polyurethane topcoat (MIL-PRF-85285 qualified) (White)**
- **On Steel:**
  - **Hentzen 00812FEP-ZVOC/06888CEH-ZVOC Zero VOC zinc rich primer (A-A-59745 qualified)**
  - **Hentzen 04605BUX-ZVOC/04600CHA-ZVOC Zero VOC exempt solvent-borne polyurethane topcoat (MIL-PRF-85285 qualified) (Blue)**

Transporter Erector

Current Status

- Follow-on project plan is pending

Final Tasks

- Follow-on work pending
  - Perform Dem/Val
  - Complete final report

AFSPC & NASA Launch Coatings

AFSPC & NASA Launch Coatings

TRL 8

- **Project Goals/Requirements**
  - **Investigate Low/No VOC non-hazardous (high temperature) alternative coating solutions for launch facilities.**
  - **This funding will address field testing of alternative coating systems for AFSPC launch facilities in the applicable installation and/or range location.**
  - **Coating System must be able to survive 1 launch**
  - **Follow on project from NASA's coating evaluation Phase I**

AFSPC & NASA Launch Coatings

TRL 8

AFSPC & NASA Launch Coatings

TRL 8

Current Status

- Coatings have been applied to site
- BRS and coldspray equipment on order

Final Tasks

- Evaluate coatings post-launch
- Purchase equipment-metalizer
- Depaint Dem/Val date pending
- Complete final report

AFSPC Opportunity Assessment (CCAFS & JDMTA)

AFSPC Opportunity Assessment

- **Project Goals/Requirements**
  - **Opportunity assessment of de-painting, surface preparation, & coating application process' currently used at AFSPC range operations (CCAFS & JDMTA).**
  - **Provide data analyses and recommendations, a Cost Benefit Analysis and assessment to reduce environmental burden/risk processes and identify alternative environmentally preferable coating systems.**
  - **Analysis existing process', hazardous waste disposal, environmental regulations, environmental control equipment (paint booth, PPE, etc), & identify new equipment necessary to perform revised process.**

AFSPC Opportunity Assessment

Current Status

- Site surveys have been completed

Final Tasks

- Researching and evaluating alternatives
- Complete final report

F.E. Warren AFB Opportunity Assessment

F.E. Warren Opportunity Assessment

TRL

N/A

CTIO Focus

TRLs

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- **Project Goals/Requirements**
  - **Evaluate the missile maintenance activities/processes, determine environmental preferable alternatives and calculate payback for implementing alternatives.**
  - **Significant emphasis will be:**
    - **Demonstrating environmentally preferred alternatives for surface preparation,**
    - **Eliminating chromates in solids and liquids used for corrosion control,**
    - **Demonstrating technologies for de-painting operations**
    - **Reduction of hazardous waste generation**
    - **Reduction of environmental vulnerability across all media from the rework/repair modifications for the MMIII program**

F.E. Warren Opportunity Assessment

Current Status

- Kick off meeting has been completed
- Initial site visit has been set for 20 Oct – 24 Oct 08

Final Tasks

- Complete site visit
- Research/evaluate alternatives
- Complete final report

Questions???

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